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Illuminating the deep structure of the central Taiwan thrust belt using seisimic energy release

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Because of the complexity caused by oblique thrusting, determining the structure at depth across the Taiwan thrust belt is difficult from surface data alone. Therefore, we have incorporated seismicity data to see how deep the major faults in the thrust belt penetrate and, where possible, what their kinematics are. Moment magnitudes for each event have been recalculated to energy release, and maps and cross sections cut through the volume to determine where the major energy release has been taking place. In Central Taiwan, these data indicate that a significant portion of the energy release in the thrust belt is within or along the boundaries of the Hsuehshan Range. The Western Foothills show patchy energy release with a local concentration at between 8 and 10 km depth. Focal mechanisms here suggest that roughly west-directed thrusting is dominant. At the transition into the Hsuehshan Range, across the Shanghua and Shuili-Keng faults, there is a sudden deepening of the seismic activity, with major energy release taking place to depths of about 20 km. The majority of focal mechanisms suggest highly oblique to strike-slip faulting, in keeping with field observations. There is a marked drop in seismic activity at the eastern flank of the Hsuehshan Range, along the Lishan Fault. This integration of field geological observations with seismicity data has proven to be an important step in interpreting the crustal structure, kinematics and evolution of the Taiwan thrust belt.